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## MAILING ADDRESS



Sept. 1, 1965

Re: Task II Item 5 First Technical Report  
"Lamps for Rear Projection Viewers"

Dear John:

Enclosed are four copies of the subject technical report. Two additional copies have been sent directly to the Contracting Officer.

The report examines the suitability of various types of lamps for rear projection viewers. This first report was principally devoted to gathering data, defining terms, calculating representative performance and establishing a format for presentation of the data.

Some of the more important findings are:

- a.) Tungsten lamps have a high conversion efficiency of input watts to radiated watts (over 80%) but only a small fraction of the radiation is visible.
- b.) Compact arc lamps have a lower conversion efficiency of input watts to radiated watts (about 50%) but a correspondingly higher fraction of the radiation is visible. The lumens per input watt are 20% to 50% greater than tungsten with mercury-xenon having the highest luminous efficiency.
- c.) Color Temperature of Tungsten projection lamps is 3200°K to 3400°K and they therefore appear quite red. Xenon lamps operate at about 5500°K to 6000°K and therefore closely approximate sunlight. The Mercury-Xenon lamps have the green, blue and violet spectral lines of mercury and therefore appear to be blue green color.
- d.) Voltage and current variations change the color of tungsten lamps but do not change the color of the

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compact arc lamps. For all the lamps, brightness changes with power variations.

- e.) Radiation lobes of tungsten planar filaments permit slightly better collection efficiency than the compact arc lamps.

Since the mercury-xenon compact arc lamps have the highest luminous efficiency, I concur with your suggestion that you check their color for operator acceptance and acuity.

Further data will be obtained on the mercury-xenon lamps. In addition carbon arc and other lamps types will be reviewed and data submitted in subsequent reports.

For typical high performance projection and condenser optics, only about 10% of the total lamp lumens are put onto the screen. Methods of significantly increasing this percentage should be explored.



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